**The Little Planet That Couldn't**: Is Pluto just an ice cube?

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We live on one, we've been observing a handful of others since antiquity, we've sent space probes to almost as many as can be reached and we're currently discovering new examples around distant stars at a staggering rate. So it might come as something of a surprise that we don't really seem to know what a planet is. But we don't. The recent decision by the American Museum of Natural History to question Pluto's right to be called a planet has reopened a fascinating--and instructive--debate.

When Pluto was discovered by Clyde Tombaugh in 1930, there wasn't much doubt about its being a planet. Percival Lowell, the man who had built the observatory where Tombaugh worked, had predicted that there should be a ninth planet beyond the orbit of Neptune. Naturally, Tombaugh thought he had found it. The only objects in the solar system were planets (big things that orbit the sun), moons (things that orbit planets), asteroids (little stony things found between the orbits of Mars and Jupiter) and comets (little icy things that develop a gaseous "coma" and tail when they pass close to the sun). With that menu to choose from, Pluto could only be a planet.

Today things look less clear. Since 1992 astronomers have been finding big lumps of ice in orbits very similar to Pluto's: almost 400 have been discovered to date, some as large as the largest asteroid (though in composition they're much closer to comets). Some say that Pluto should properly be classed as the largest of these "Trans-Neptunian Objects," or TNOs, rather than as a planet proper. There is precedent for such a move. When Guiseppe Piazzi discovered something orbiting between Mars and Jupiter 200 years ago, it was proclaimed a planet; Ceres is now seen as the largest of the asteroids and nothing more.

To many astronomers this is heresy. Pluto was one of the planets they learned as schoolchildren. It's undeniably larger than any other TNO so far discovered. It has great scientific interest--and it is the only planet to have been discovered by a great American, to boot. (Pluto's demoters believe this fact is a strong, if unvoiced, factor in the traditionalist arguments championed by, among others, the American Astronomical Society.) Changing things would be needlessly confusing to the public--and possibly to Congress. Planetary scientists have long wanted NASA to send a mission to Pluto, but the plans have been repeatedly deferred and canceled. A current last-ditch effort at a shoestring mission is underway and it needs all the PR it can get. Having its target demoted from its planetary status might not be helpful.

Though heartfelt, these arguments are not particularly strong. Since the Voyager missions revealed the extraordinary faces of the major moons of Jupiter, Saturn and Neptune (all six of them larger than Pluto), no one has been able to pretend that planets are uniquely attractive heavenly bodies; Pluto doesn't have to be a planet to be interesting. And the size question cuts both ways. Yes, Pluto may be larger than any other known TNO, but it is much smaller than Mercury, the smallest of the other eight planets.

As a matter of practical politics it might indeed be better to wait five years or so. By then either a mission will already be underway or the once-in-many-lifetimes opportunity to mount one will be gone. For most of Pluto's 2i-century-long year, its thin atmosphere lies frozen on its surface. Only during its brief few decades of summer is it really worth visiting. If you think a thin envelope of gas that appears only during Pluto's closest approach to the sun sounds like a comet, you have a point. And if NASA's mission to Pluto doesn't get launched, Pluto will look even more cometary. NASA has a history of canceling comet missions.

There is a more principled argument for allowing Pluto to stay a planet. Pluto is big enough, which means it has enough gravity, to have pulled itself into a spherical shape. This differentiates it from most comets and asteroids, which are oddly shaped, and implies that it has a complex, layered internal structure. A revised definition of planets as gravitationally collapsed, nonluminous structures would let Pluto in. But it would also let in many moons, some of the largest asteroids and quite a few of the TNOs. On this definition, the total number of planets in the solar system would rise to 30 or more.

People are comfortable with nine planets and don't want any more, some astronomers worry. If astronomers start promoting and demoting bits of the solar system, they fear lay people will think less of them. But this is wrong. The members of the public most interested in such matters--schoolchildren--will be quite happy with more planets. They can keep a couple of hundred Pokemons straight in their heads: a couple of dozen planets shouldn't present a problem. More important, seeing scientists change their minds is an important lesson in and of itself. It reinforces that scientific ideas are often provisional and that new information changes the way things are viewed. It shows that science is about self-criticism and growth, about being open to the new ideas a serious study of the universe will always bring with it. And that's a lesson that is worth learning at any age.